

STUDIES OF THE GENUS EMPOASCA (HOMOPTERA, CICADELLIDAE)

PART X.¹ FOURTEEN NEW SPECIES OF EMPOASCA FROM MEXICO

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This paper is a continuation of our study of the leafhoppers in the genus *Empoasca*. It deals entirely with species taken in Mexico. Species previously described by us from Mexico are as follows: *serrula*, *dampfi*, *arator*, *prona*, *resupina*, *duodens*, *ingena*, *obstipa*, *crocostigmata*, *crocovittata*, and *omani* variety *iguala*.

Empoasca caraba n. sp.

Resembling *madra* somewhat in shape of lateral processes but with extra processes on aedeagus and a distinctly different dorsal spine. Length 3.5 mm.

External characters.—Frons, clypeus, vertex, pronotum and scutellum yellowish. Vertex slightly produced with a median stripe of white which extends across both the pronotum and scutellum. A white spot on each side of median line of vertex. Whitish spots on each side of median line of pronotum. Wings subhyaline with faint golden stripes, apices smoky. Female last ventral segment rounded with a slight median notch.

Internal male genitalia.—Lateral processes heavy, broad at base, tapering gradually caudad to pointed tips that are directed slightly dorsad and gently curved outward. Aedeagus broadened medially with a sharp-pointed apical portion that is directed caudad and dorsad. A pair of long, straight, slender, pointed, processes arise at base of enlarged portion which are directed caudad and dorsad, ending just before apex of aedeagus. The anterior projecting processes connect to the base of the dorsal spine which is broad, directed ventrad, but narrowed abruptly to a pointed slightly anteriorly directed tip.

Holotype male, allotype female, and a large series of male and female paratypes from Carapan, Mich., Mexico, (432 Km.²) 10-2-41, collected by DeLong, Good, Plummer, and Caldwell. Also male and female paratypes from Mexico City, Mex. (west 18 Km.) 9-1-39, collected by DeLong; Toluca Road, Mexico, 11-24-38, collected by Caldwell; Tres Cumbres, D. F. (52 Km.) 10-21-41, collected by DeLong, Caldwell, Good and Plummer; Zitacuaro, Mich., (160 Km.) 9-29-41, and Tuxpan, Mich., (185 Km.) 10-5-41, collected by the same men. Types deposited in the authors' collections.

Empoasca stalsisa n. sp.

A small species that appears to be in the *alboneura* group. The lateral processes and dorsal spine are characteristically shaped. Length 3 mm.

External characters.—Color orange-red with smoky spots on the forewings. Vertex slightly produced with a median whitish longitudinal stripe which continues faintly across the pronotum and a white spot on each side next to the eyes. In some specimens, there is another faint whitish spot back of each of those next to the eyes. Pronotum with a median and two lateral whitish spots on anterior margin. Wings hyaline with smoky spots. Female unknown.

Internal male genitalia.—Lateral processes broad basally, narrowed, then gradually broadened, directed caudad and dorsad to pointed tips. In ventral view they are very broad just

¹Previous parts of this study have appeared as follows: Ohio Journal of Science, 32: 393-401; 35: 29-39; 36: 225-230; 38: 90-96; 39: 110-118; 42: 123-126; and Annals of the Entomological Society, 27: 604-609; 33: 608-611; 35: 105-109.

²Distance from Mexico City in kilometers.

before the apex. Aedeagus at apex appearing hour-glass shaped in ventral view. Near base of enlarged portion are anteriorly projecting pieces which connect to the base of the broad, curved, gently rounded dorsal spine.

Holotype male, and a series of male paratypes from Iguala, Guerrero, Mexico, 9-11-39, collected by Dr. DeLong and a male paratype from Santa Engracia, Mexico, 11-8-38, collected by Dr. J. S. Caldwell. Types deposited in the authors' collections.

***Empoasca semanta* n. sp.**

A small species with characteristic internal male genitalia and dorsal spine. Length 2.5 mm.

External characters.—General coloration orange-yellow to light brown. Vertex rounded with a median and two lateral ivory spots. Three ivory spots near anterior margin of pronotum. Forewings tinged dark golden with smoky apices. Hindwings hyaline. Female unknown.

Internal male genitalia.—Lateral processes tapering gently, curving upward to pointed tips which are directed posteriorly and curved slightly outwardly. Aedeagus becoming broadened medially, with a long dorsally directed slightly curved apex and an anteriorly directed portion which is connected to the dorsal spine. Dorsal spine broad at base tapering quickly to a narrow, ventrally and anteriorly directed apex.

Holotype male, and 19 male paratypes from Iguala, Guerrero, Mexico, 9-11-39, collected by the junior author. Types deposited in the authors' collections.

***Empoasca cerata* n. sp.**

Resembling *ingena* in coloration but with long lateral processes similar to *curvata*. Length 3.5 mm.

External characters.—General coloration pale to white marked with reddish to brownish spots. Vertex roundedly produced, with a median black longitudinal line, reddish centrally and lighter near the eyes. Ivory spots surrounding ocelli and a small comma-shaped spot on each side of median black line. Pronotum dark reddish brown with a whitish triangular spot back of each eye. Scutellum dark reddish-brown. Wings sub-hyaline with forewings spotted reddish-brown. Female unknown.

Internal male genitalia.—Lateral processes tapering gradually posteriorly to pointed tips which are directed upward and curve outward. Upper fourth of aedeagus enlarged with a posteriorly directed spine near base of enlargement and an anterior projection connecting to the base of the dorsal spine. Dorsal spine narrowed, directed downward to an anteriorly pointed tip.

Holotype male, and male paratype from Carapan, Mich., Mexico, (432 Km.) 10-2-41, collected by DeLong, Plummer, Good, and Caldwell. Types in the authors' collections.

***Empoasca caldwelli* n. sp.**

A large species with distinct characters of the male genital chamber but resembling those of *thela* and *dilitara*. Length 4 mm.

External characters.—General coloration yellowish. Vertex rounded, with a median and two lateral ivory spots. Pronotum with four irregular ivory spots on anterior margin. Scutellum with two median longitudinal ivory stripes. Wings hyaline with forewings slightly tinged with yellow. Female last ventral segment truncate.

Internal male genitalia.—Lateral processes narrowed at basal half, becoming broader, directed posteriorly and curving upward to pointed tips which appear claw-like. Aedeagus broadened near upper portion with a long anteriorly curving apex and an anteriorly projecting basal portion connecting to the dorsal spine. A long narrow caudal process parallels the upper portion of the aedeagus and arises at base of broadened portion. Dorsal spine lobe-like, directed ventrally with a rounded blunt apex.

Holotype male, allotype female, and a male paratype from Mexico City, Mexico, collected by Dr. A. Dampf on 10-18-32, 10-27-31, and 8-5-32 respectively. Types deposited in the authors' collections.

The authors take pleasure in naming this species after Dr. J. S. Caldwell who has collected and described many species of Homoptera.

***Empoasca bispinata* n. sp.**

Resembling *bifurcata* and other species of the *fabae* group, but with characteristic spines on the aedeagus. Length 3 mm.

External characters.—General coloration golden to pale yellow. Vertex with ivory spotting and a very narrow, median, dark, longitudinal line. Pronotum with three ivory spots on anterior margin; scutellum with median, longitudinal ivory striping and an ivory spot on each anterior corner. Forewings subhyaline with a faint yellowish tinge. Female last ventral segment rounded and slightly produced.

Internal male genitalia.—Lateral processes small, narrow, tapering gradually and curving caudally and slightly dorsally to pointed tips. Aedeagus narrow with a dorsally directed apex and a pair of medially located divergent sharp spines which are directed caudad. Dorsal spine notched at the apex forming two pointed tips, which are directed slightly anteriorly, the ventral one being the longest.

Holotype male and allotype female from Finca Vergel, Chiapas, Mexico, collected by Dr. A. Dampf on 5-22-35 and 5-19-35 respectively. Types deposited in the authors' collections.

***Empoasca acantha* n. sp.**

A spotted species with characteristic shape of lateral processes and dorsal spine. Length 3 mm.

External characters.—Frons and clypeus brown with a median white stripe which continues over the vertex to the pronotum. A white dot on each side of median line of vertex and a white stripe next to each eye. Pronotum brown with a white median spot and two lateral white spots on anterior margin. Wings brown with subhyaline spots and smoky apices. Female last ventral segment roundedly produced.

Internal male genitalia.—Lateral processes, in lateral view broad at base, and bending rather abruptly at two points to form upward pointing tips. Aedeagus narrow, apical fourth slightly enlarged with caudal portion rounded and pointed upward and an anteriorly produced piece which connects to the dorsal spine. Dorsal spine broad at base, gradually tapering to a pointed apex which is directed ventrally and slightly anteriorly.

Holotype male from Acapulco Road, Mexico, 11-22-38, collected by Dr. J. S. Caldwell. Female allotype and a male paratype from Tres Cumbres, D. F. Mexico, (52 Km.) 10-21-41, collected by DeLong, Caldwell, Plummer and Good. Types deposited in the authors' collections.

***Empoasca rumexa* n. sp.**

Resembling *sativae* externally but with characteristic shape of lateral processes and heavy dorsal spine as in *delongi*. Length 2.5 mm.

External characters.—Color golden yellow with white spots. Vertex slightly produced with a median and two oblique white spots on the dorsal side. Pronotum with a median broadly wedge-shaped white spot and lateral white spots on anterior margin. Scutellum with a median longitudinal white stripe. Wings hyaline with the first pair slightly tinged with yellow. Female unknown.

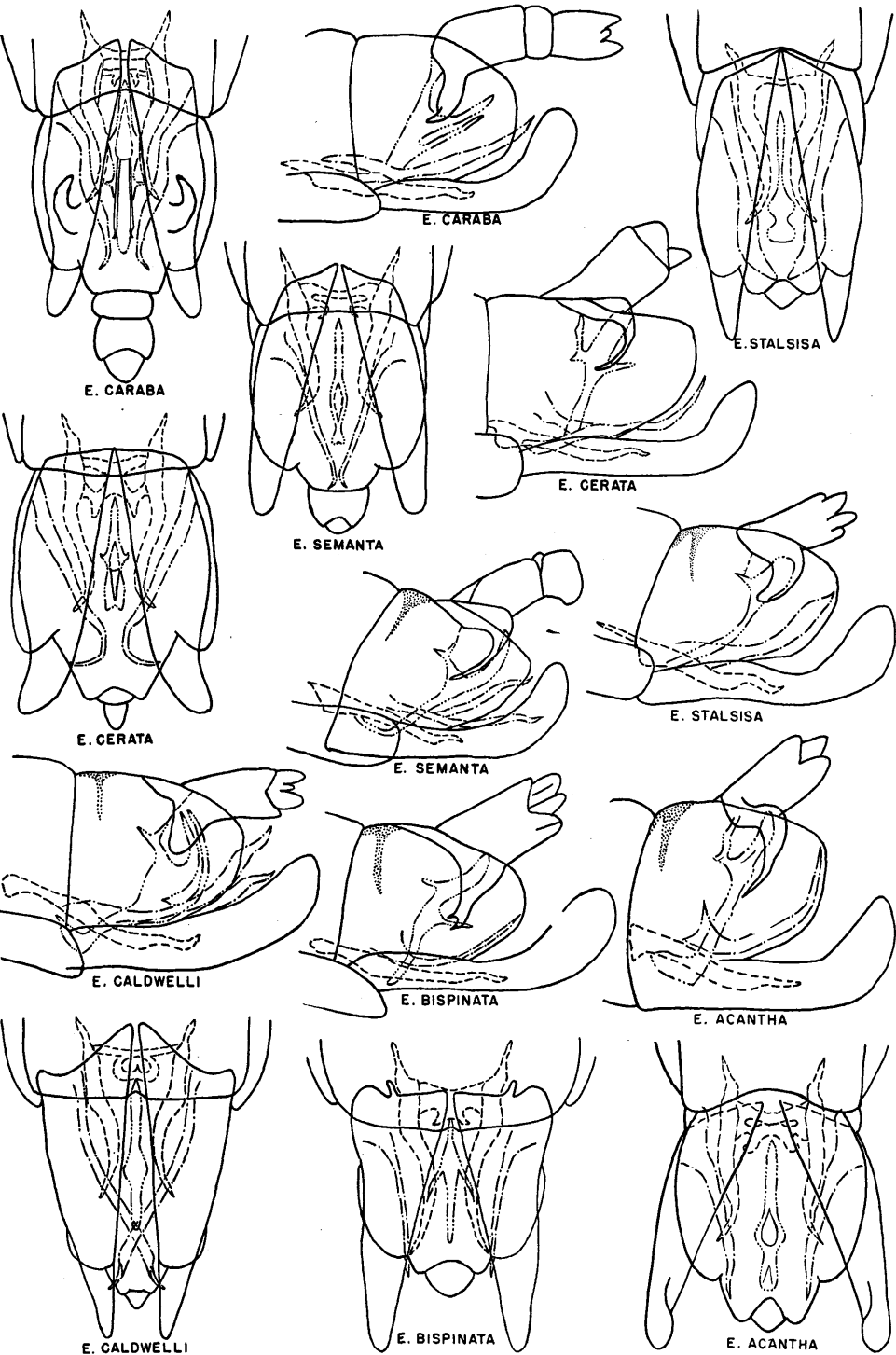
Internal male genitalia.—Lateral processes gradually tapered, curving upward to pointed tips which are bent inward. Aedeagus enlarged and rounded at apex with anterior processes arising at base of enlargement and connecting to the base of the dorsal spine. Dorsal spine heavy and long, tapered to a pointed tip directed ventrally and slightly anteriorly.

Holotype male, and male paratypes from Iguala, Guerrero, Mexico, 9-11-39, collected by the junior author and deposited in the authors' collections.

***Empoasca adexa* n. sp.**

A small spotted species resembling *acantha* in coloration but with distinctly different lateral processes and dorsal spine. Length 2.5 mm.

External characters.—Frons and clypeus brown with a median white stripe which continues over the vertex to the pronotum. On each side of the median line on margin of the vertex is a



Ventral and lateral views of the posterior end of the abdomen showing the internal pieces of the male genital chamber.

white dot and a dash of white next to each eye. Dorsally the vertex has a white spot on each side of posterior margin next to the eyes. Pronotum brown with a median gray longitudinal stripe, a white spot behind each eye and a thin median white spot on anterior margin. Wings brown with subhyaline spots. Female last ventral segment rounded and produced medially.

Internal male genitalia.—Lateral processes small, tapered gradually, curving caudally and dorsally with the rather pointed tips directed inwardly. Aedeagus narrow with apical third enlarged, rounded and directed dorsally with an anterior dorsally produced piece near base of enlargement which connects to the dorsal spine. Dorsal spine broad at base tapering gradually and curving ventrally and anteriorly to a bifid apex, which is curved slightly inward.

Holotype male, allotype female and male and female paratypes from Carapan, Mich., Mexico (432 Km.) 10-2-41, collected by DeLong, Good, Caldwell and Plummer. A male paratype from Acapulco Road, Mexico, 11-22-38, collected by Dr. J. S. Caldwell. Types deposited in the authors' collections.

***Empoasca serpula* n. sp.**

A small species resembling *galluxa* in shape of lateral processes, but with a very long curved dorsal spine by which the separation can be easily made. Length 2.5 mm.

External characters.—Frons, clypeus, vertex, pronotum and scutellum yellow to golden. Vertex slightly produced with a faint median line and a dash of white on each side. Pronotum with two median and two lateral white spots on anterior margin. Wings subhyaline. Female last ventral segment truncate.

Internal male genitalia.—Lateral processes short, slender, about same length as the styles, gently curving dorsad to inwardly curved tips. Aedeagus near apex long, narrow and dorsally directed, with anteriorly projecting pieces which connect to the base of the long narrow curving dorsal spine that almost parallels the pygofer. The tips of the spine are gently curved inward.

Holotype male, allotype female, and two male and one female paratypes from Iguala, Guerrero, Mexico, 9-11-39, collected by DeLong; one male paratype from Mexico City, 9-19-31, collected by Dr. A. Dampf. Types deposited in the authors' collections.

***Empoasca bulba* n. sp.**

Resembling *bicornia* in shape of lateral processes but with very broad aedeagus in ventral view and a truncate dorsal spine. Length 3 mm.

External characters.—Vertex roundedly produced, yellowish in color with some greenish areas and a very faint median line. Pronotum and scutellum yellowish-green with a median whitish spot on anterior margin of pronotum. Wings subhyaline with a tinge of yellowish-green. Female last ventral segment roundedly produced.

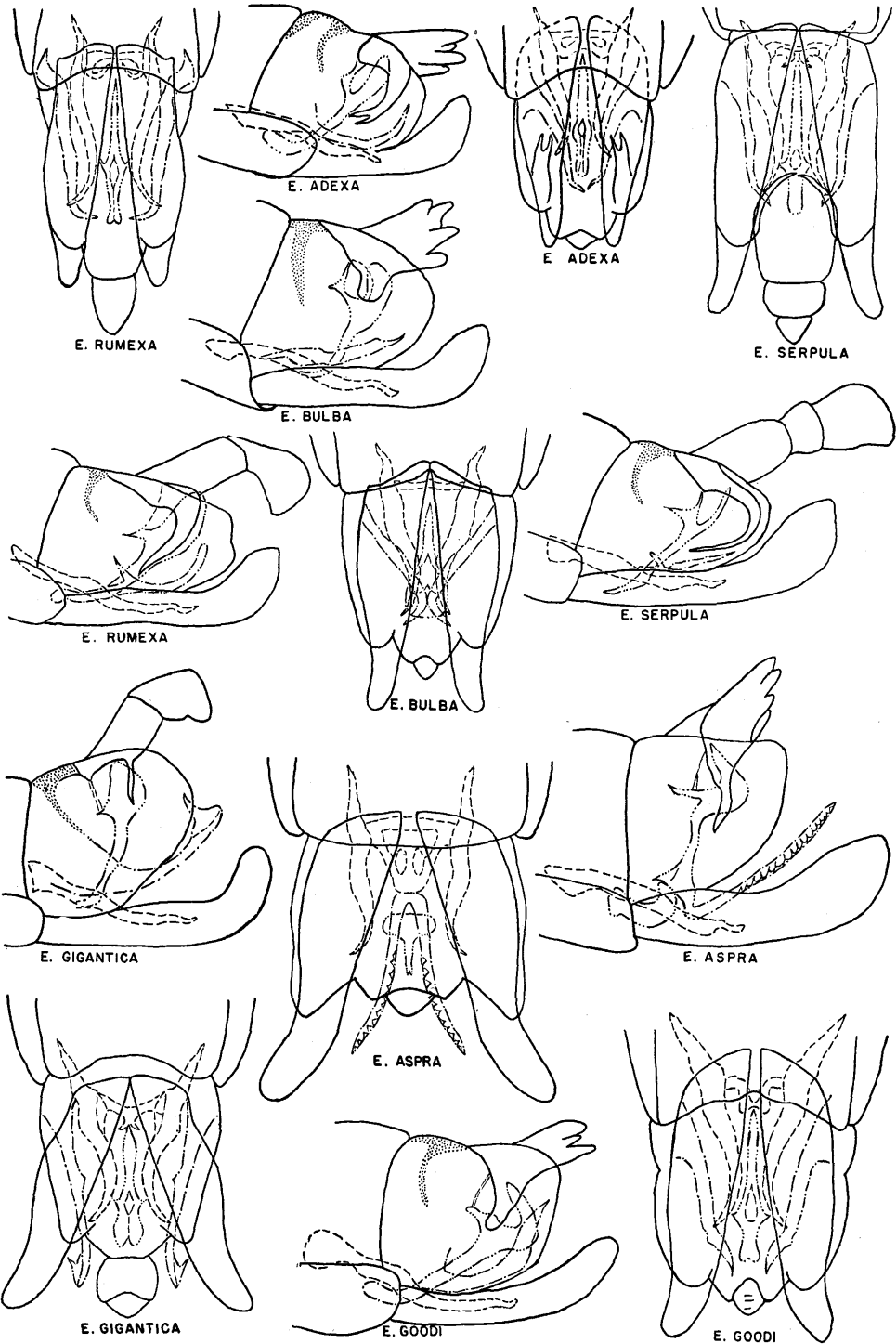
Internal male genitalia.—Lateral processes in ventral view, short, stout, curving inwardly to tapered pointed tips which are bent and directed outward. Aedeagus very broad at apex in ventral view and medially notched. In lateral view the apex is enlarged and rounded with an anterior projecting piece near base of bulbous portion which connects to dorsal spine. Dorsal spine broad at base and narrowed slightly to a truncated ventrally directed apex.

Holotype male, allotype female, and male and female paratypes from Cordoba, V. C. Mexico, 10-8-41, collected by DeLong, Good, Caldwell and Plummer. Also three male paratypes from Carapan, Mich., Mexico, (432 Km.) 10-2-41, collected by the same men and one male paratype from Vera Cruz, Mexico, Aug. 1934, collected by Dr. A. Dampf. Types in the authors' collections.

***Empoasca aspra* n. sp.**

Resembling *ponderosa* in shape of dorsal spine, but a much larger species with heavier processes on the aedeagus. Length 4.5 mm.

External characters.—Frons, clypeus, vertex, pronotum and scutellum yellow-green. Vertex slightly produced with a faint median line. Pronotum with a whitish spot on anterior margin, subhyaline in central area and posterior margin. Wings milky to subhyaline. Female last ventral segment roundedly produced.



Ventral and lateral views of the posterior end of the abdomen showing the internal pieces of the male genital chamber.

Internal male genitalia.—Base of aedeagus with a pair of long processes extending dorsally and caudally. These are much heavier than those found in *ponderosa* but very similar to those of *coccinea*. Apical portion in side view, with a broad posteriorly directed piece that curves sharply and tapers abruptly to a dorsally pointed tip. Upper part of aedeagus attached to the base of the dorsal spine which is ventrally directed and dagger-shaped except for a shallow notch on the anterior margin. Bending at the notch causes the tip to curve slightly anteriorly.

Holotype male, allotype female, and a large series of male and female paratypes from Rio Frio, D. F. Mexico, (55 Km.) collected by DeLong, Good, Plummer, and Caldwell on 10-7-41, and a pair of paratypes from Acapulco Road, Mexico, 11-22-38, collected by J. S. Caldwell. Types deposited in the authors' collections.

***Empoasca gigantea* n. sp.**

A very large species which resembles *dactylata* in shape of lateral processes but with characteristic dorsal spine and coloration. Length 5-5.5 mm.

External characters.—Coloration somewhat variable in degree and intensity, the males showing the deeper tones. Frons and clypeus of males usually black which extends to margin of vertex. From dorsal aspect this coloration appears as three black spots, one median and two lateral next each eye. Remainder of vertex greenish-yellow with a faint black median line and a green spot on each side. Pronotum greenish-yellow anteriorly, becoming darker centrally and posteriorly. Three darkened stripes often present on scutellum. Wings milky to hyaline with brown spotting. Females have similar coloration except for yellow frons and clypeus and three black dots on margin of vertex. Female last ventral segment roundedly produced.

Internal male genitalia.—Lateral processes in lateral view, long, curved slightly upward, with a dorsally projecting process just before the rounded apex. Aedeagus much broadened apically in lateral view. Dorsal spine quite small and narrowed to a ventrally projecting tip.

Holotype male, allotype female, and a large series of male and female paratypes from Rio Frio, D. F. Mexico (55 Km.) collected by DeLong, Good, Caldwell, and Plummer on 10-7-41, and Mt. Popo, Mexico, 9-28-41, collected by the same men. Types deposited in the authors' collections.

***Empoasca goodi* n. sp.**

A large species, resembling *gigantica* in size and coloration, but with distinctly different dorsal spine and lateral processes. Length 5 mm.

External characters.—Frons and clypeus of males usually brown to black colored. This extends to the margin of the vertex which appears from dorsal view as three black dots, one median and two lateral, which are next to the eyes. Remainder of the vertex greenish-yellow with a very faint median line. Pronotum yellowish anteriorly, becoming darker centrally and posteriorly. Scutellum yellow in color. Wings hyaline with faint yellow striping and smoky apices. Females similar in color except for yellow frons and clypeus and three black dots on margin of vertex. Female last ventral segment almost truncate with a median notch.

Internal male genitalia.—In lateral view, the lateral processes are directed posteriorly for one half their length, becoming broadened at this point and bending upward and tapering to pointed tips. Aedeagus in lateral view, enlarged near the apex into a hook-like process which is directed upward and slightly anteriorly. Dorsal spine broad at base and gradually narrowed to a rounded apex which is directed ventrad.

Holotype male, allotype female, and a large series of male and female paratypes from Carapan, Mich., Mexico (432 Km.) 10-2-41, all collected by Drs. D. M. DeLong, J. S. Caldwell, C. C. Plummer and Mr. E. E. Good. Other paratypes from Mexico City, D. F. 9-13-39, collected by DeLong; and Rio Frio, D. F. Mexico, 10-7-41, collected by the above named men. Types deposited in the authors' collections.

The authors take pleasure in naming this species after Mr. E. E. Good who has collected many interesting species of Cicadellidae.